

# Claims

- [c1] 1.A reactor comprising:  
a first gas valve for controlling a flow rate of a first gas;  
a second gas valve for controlling a flow rate of a second gas;  
a control unit for controlling the first gas valve and the second gas valve; and  
a process chamber connected to the first gas valve and the second gas valve for accommodating the first gas and the second gas and performing deposition processes;  
wherein the first gas valve and the second gas valve are not turned on simultaneously such that the first gas and the second gas are inducted into the process chamber in separate intervals to perform their corresponding deposition processes.
- [c2] 2.The reactor of claim 1, wherein the reactor is a plasma enhanced chemical vapor deposition (PECVD) reactor.
- [c3] 3.The reactor of claim 1, wherein both the first gas valve and the second gas valve are normally closed valves.
- [c4] 4.The reactor of claim 1, wherein the first gas is a hydro-

gen-based (H-based) gas.

- [c5] 5.The reactor of claim 1, wherein the second gas is an oxygen-based (O-based) gas.
- [c6] 6.The reactor of claim 1, wherein the control unit is a logic circuit.
- [c7] 7.The reactor of claim 1, wherein the process chamber comprises at least one mass flow controller (MFC) for accepting commands of a pre-set control process to control the flow rates of the first gas and the second gas.
- [c8] 8.The reactor of claim 1, wherein each of the first gas valve and the second gas valve is turned on one interval after the other is turned off.
- [c9] 9.The reactor of claim 1, wherein residual gas in pipelines between both of the first and second gas valves and the process chamber and residual gas in the process chamber are cleaned out by a purge step.
- [c10] 10.The reactor of claim 1, further comprising a remote plasma cleaning system (RPCS) installed between the first gas valve, the second gas valve, and the process chamber, and the RPCS is used for cleaning residual gas and byproducts.
- [c11] 11.The reactor of claim 1, further comprising a third gas

valve for inducting a tetra-ethyl-ortho-silicate (TEOS) into the process chamber.

[c12] 12.A reactor for depositing a tetra-ethyl-ortho-silicate based silicon oxide layer and a silane-based silicon oxide layer in a process chamber comprising:  
a first gas valve for controlling a flow rate of a hydrogen-based (H-based) gas;  
a second gas valve for controlling a flow rate of an oxygen-based (O-based) gas;  
a third gas valve for controlling a flow rate of tetra-ethyl-ortho-silicate (TEOS);  
a control unit for controlling functions of the first gas valve and the second gas valve; and  
the process chamber connected to the first gas valve and the second gas valve for accommodating the hydrogen-based gas and the oxygen-based gas and performing deposition processes;  
wherein the first gas valve and the second gas valve are not turned on simultaneously such that the hydrogen-based gas or the oxygen-based gas is inducted into the process chamber to perform the corresponding deposition process.

[c13] 13.The reactor of claim 12, wherein the reactor is a plasma enhanced chemical vapor deposition (PECVD) reactor.

- [c14] 14.The reactor of claim 12, wherein the first gas valve, the second gas valve and the third gas valve are normally closed valves.
- [c15] 15.The reactor of claim 12, wherein the hydrogen-based gas is silane ( $\text{SiH}_4$ ), and the oxygen-based gas comprises oxygen ( $\text{O}_2$ ) or ozone ( $\text{O}_3$ ).
- [c16] 16.The reactor of claim 12, wherein the control unit is a logic circuit.
- [c17] 17.The reactor of claim 12, wherein the process chamber comprises at least one mass flow controller (MFC) for accepting commands of a control process to control the flow rates of the hydrogen-based gas and the oxygen-based gas.
- [c18] 18.The reactor of claim 12, wherein each of the first gas valve and the second gas valve is turned on one interval after the other is turned off.
- [c19] 19.The reactor of claim 12, wherein residual gas in pipelines between both of the first and second gas valves and the process chamber and residual gas in the process chamber are cleaned out by a purge step.
- [c20] 20.The reactor of claim 12, further comprising a remote plasma cleaning system (RPCS) installed between the first

gas valve, the second gas valve, and the process chamber, and the RPCS is used for cleaning residual gas and byproducts.